C/FED

SES-073-87
8 April 1987

MEMORANDUM FOR: Distribution

THROUGH: [ ] C●TR   STAT

FROM: [ ], M/SES

SUBJECT: INTERNET Documentation

REFERENCE: ESG Memo dated 3 October 1986
Subject - Results of 2 October 1986 CCB

1. The Reference memo reported the CCB deferral of RFC GE-017-86, until an agreement was reached between C/ESG and C/OPS on desired changes to the INTERNET ICD. C/ESG and C/OPS have reached an agreement on desired changes to the INTERNET documentation. This agreement has also resulted in the production of an INTERNET System Specification as well as an INTERNET ICD.

2. The attached documents, INTERNET Control Center System Specification (MPD-910-001) and INTERNET - Headquarters Interface Control Document (MPD-910-200), were resubmitted to the CCB Chairman as RFC GE-017-86R1. The CCB Chairman has reviewed and approved RFC GE-017-86R1 for distribution.

3. This action completes the formal distribution of the INTERNET Control Center System Specification (MPD-910-001) and the INTERNET - Headquarters Interface Control Document (MPD-910-200).

4. For more information or additional copies of the attachments, please contact [ ] at 527-8600.   STAT
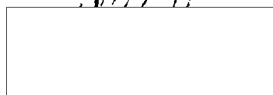
[ ]   STAT

Attachments:
   A. INTERNET Control Center System Specification (MPD-910-001)
   B. INTERNET - Headquarters Interface Control Document (MPD-910-200)

SES-073-87

SUBJECT: INTERNET Documentation

DS&T/FBIS/ESG/ADD/SES: [   ] **(8APR87)**   STAT

Distribution:
Original - GE/SES CCB Chrono
      1 - C/ESG
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FBIS
Request for Change

Title: INTERNET SPECIFICATION AND INTERFACE DOCUMENTS	
RFC No.: GE-017-86 R1	**Contract No.:** 85X-102-200-000
Date Logged: 16 MAR 87	**Priority:**
Proponent of RFC: SES	STAT
Approval for Submittal:	**Date:** 3/23/87
Originator:	**Telephone No.:** 527-8602 STAT

Affected Documents:

Title:	Number:
FBIS INTERNET CONTROL CENTER SYSTEM SPECIFICATION	MPD-910-001
FBIS INTERNET - HEADQUARTERS INTERFACE CONTROL DOCUMENT	MPD-910-200

Need for Change: INITIAL RFC WAS WRITTEN TO PLACE INTERNET ICD UNDER CCB CONTROL. IN THE INTERIM THIS DOCUMENT WAS SPLIT INTO THE TWO DOCUMENTS LISTED ABOVE. THESE DOCUMENTS WERE SUBSEQUENTLY DISTRIBUTED IN AN RFP PACKAGE AND ARE TECHNICALLY UNDER CCB CONTROL. THIS REVISED RFC SHOULD BE APPROVED TO FORMALLY PLACE THEM UNDER CCB CONTROL.

Description of Change: INITIAL ISSUE OF DOCUMENTS.

Cost/Schedule Impact: NONE

Date Closed:	**Result:**

CCB Member Recommendations:

MEMBER	NAME	APPROVE	DISAPPROVE	DEFER	DATE
C/ESG, CHAIRMAN		✓			3/ STAT
C/ADD					
C/E&PS					
C/OPS					
C/PROD					
C/AG					
DC/ADD					
C/FED					
C/HED					
SEM					
C/R&AB					
C.O.					

FBIS

INTERNET CONTROL CENTER
SYSTEM SPECIFICATION

MPD-910-001

15 JANUARY 1987

CHANGE LOG

TITLE: INTERNET CONTROL CENTER SYSTEM SPECIFICATION DOCUMENT MPD-910-001

REV	DATE	PAGES AFFECTED	RFC NO.

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1.0   SCOPE

This document contains the functional and performance specifications for the INTERNET Control Center System located in Room 3620 of the FBIS Headquarters Building at Reston, Virginia. The requirements contained herein are derived from the INTERNET Concept of Operations paper (dated 31 March 1986) and the INTERNET Interface Control Document (MPD-910-200).

Section 3.1 provides a narrative description of the functional requirements for the INTERNET Control Center System.

Section 3.2 identifies and combines into logical groupings, the functional and performance requirements described in Section 3.1. The intent of this section is that these functions shall be allocated to ensure that all functional and performance requirements are met and can be verified in accordance with Section 4.0.

2.0   APPLICABLE DOCUMENTS

2.1 Compliance Documents

2.1.1   Statement of Work for the INTERNET Control Center
System Procurement

2.1.2   INTERNET Interface Control Document
MPD-910-200

2.2 Other Documents

2.2.1   INTERNET Operations Concept Paper dated 31 March 1986

2.2.2   INTERNET Operations & Maintenance Guide dated
November 1986 (Section 3.6 only)

3.0   **INTERNET CONTROL CENTER SYSTEM SPECIFICATIONS**

3.1   **INTERNET Control Center System Functional Description**

INTERNET is a satellite based communications system which shall deliver television, wideband analog facsimile signals, and high quality audio signals to FBIS Headquarters.

The INTERNET Control Center System shall function as the routing and switching center for the TV and audio signals. The INTERNET Control Center System shall be located in the INTERNET Control Center (ICC) (ROOM 3620) and comprise the hardware and software necessary to perform the functions described herein. An INTERNET Console shall be provided for the INTERNET Control Officer (ICO) to monitor and control the video and audio signals available. The wideband facsimile, although a part of the INTERNET System, shall be connected directly from the Building Communications Center to the TV Center.

The INTERNET Control Center System shall contain the necessary equipment to provide for: routing of the video and audio signals, monitoring the signals and displaying transmission link activity, timing of link activity, time of day for the various nodes to INTERNET, communication over the orderwire circuit, an intercom network, and space for GFE telephone equipment. Video and audio equipment shall be provided that uses National Association of Broadcasters (NAB) broadcast quality standards. The INTERNET Console shall be designed to allow for access to GFE equipment collocated in the ICC. Figure 3.1-1 depicts the interfaces to the INTERNET Control Center System.

The INTERNET Console shall be designed so that it has an aesthetically pleasing appearance and is ergonomically effective. The INTERNET Console shall be located in the INTERNET Control Center which occupies a floor space area of 15 x 15 feet.

The Contractor shall provide a printer, collocated within the INTERNET Control Center, to terminate a selected audio circuit carrying Radio Teletype press transmissions. The printer must be capable of printing Cyrillic and English character sets and also accepting multiple baud rates. Configuration of the printer for different character sets and baud rates shall be easily changed by the ICO from the front of the printer.

The following GFE equipment shall also be collocated with the console in the INTERNET Control Center: a narrowband facsimile machine, an Atex terminal, a Delta Data terminal, and a standard five drawer file cabinet. Figure 3.1-2 shows the features of the ICC and approximate layout of equipment collocated in the room.
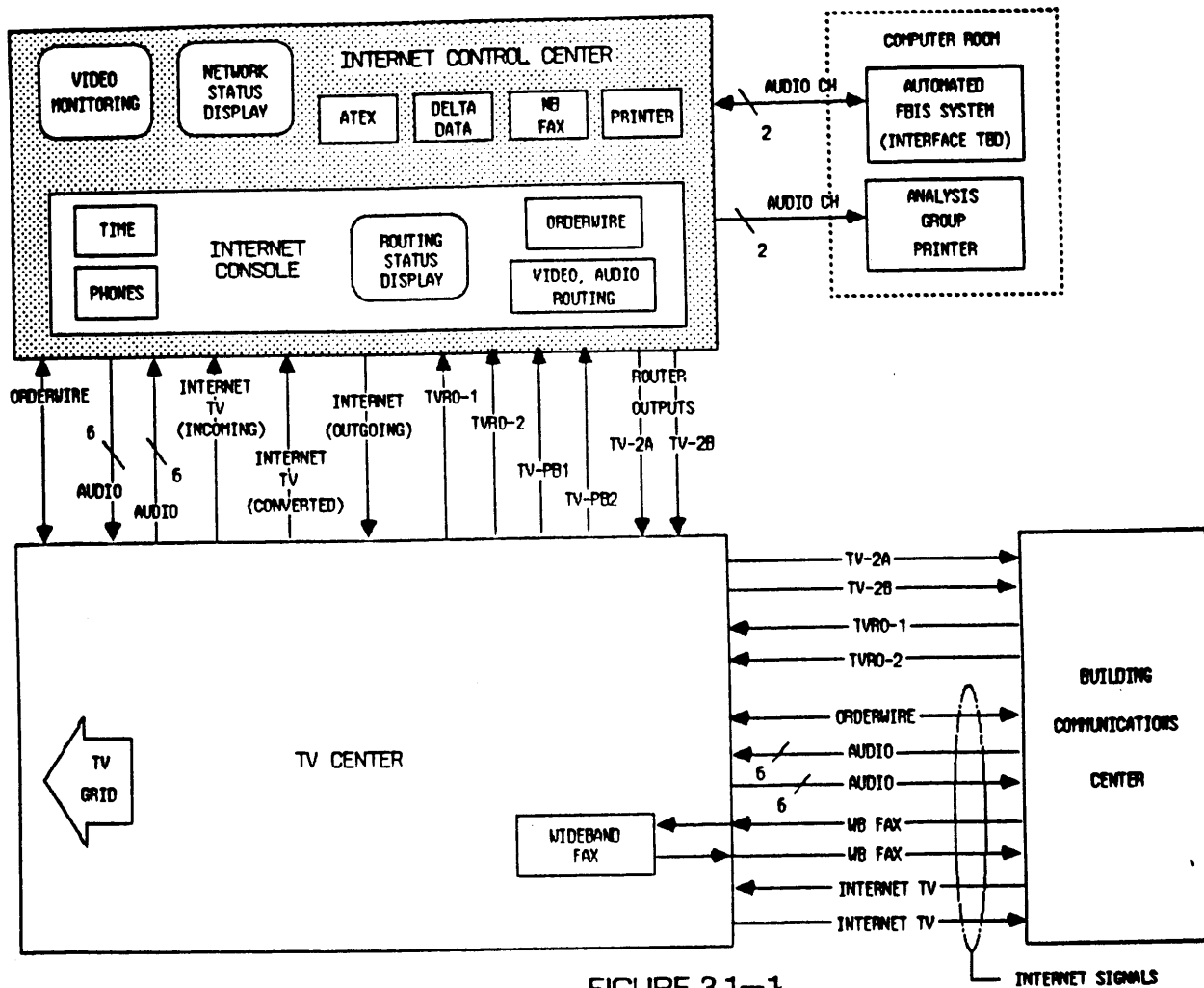
FIGURE 3.1—1

INTERNET CONTROL CENTER SYSTEM INTERFACES
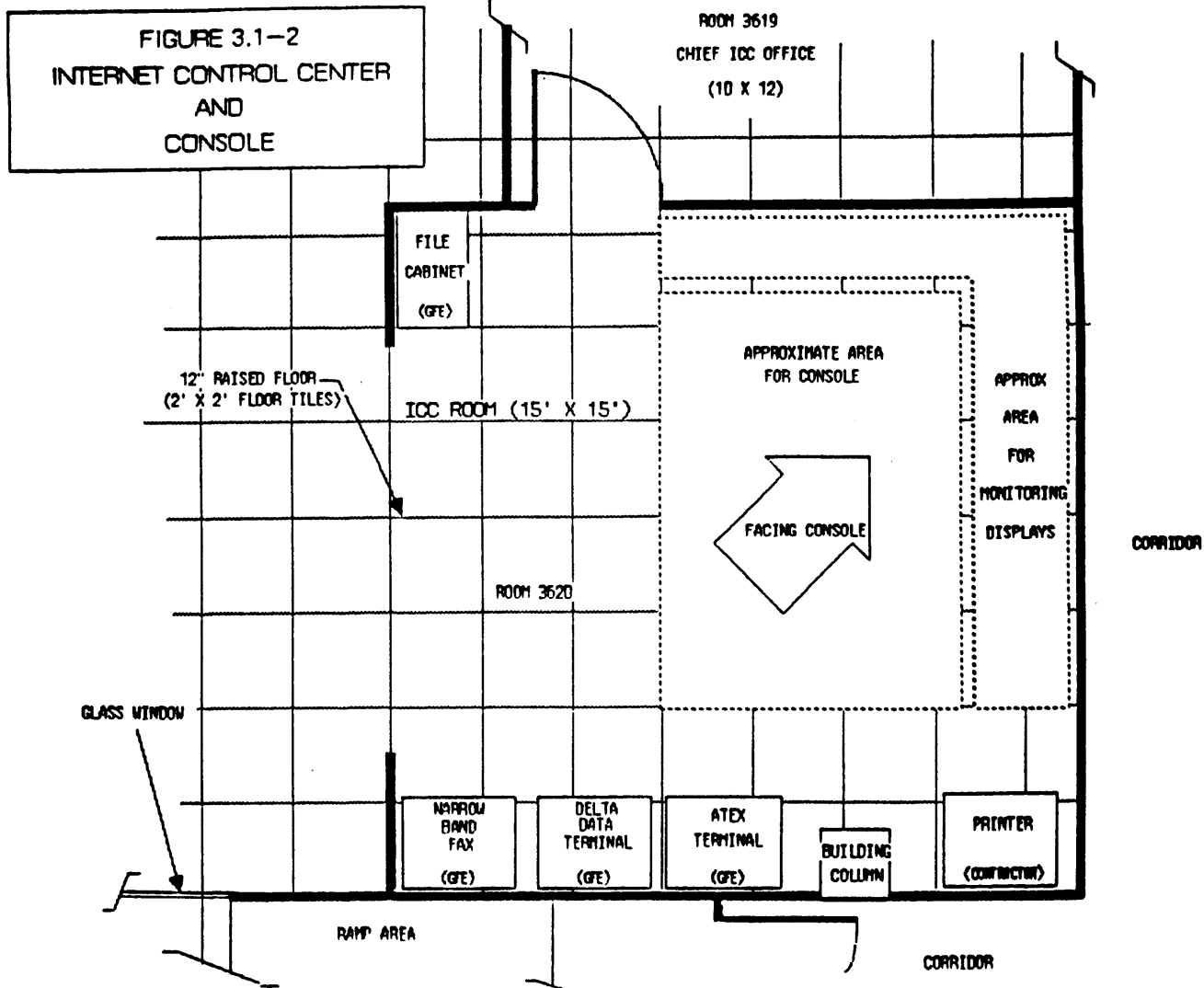
FIGURE 3.1—2
INTERNET CONTROL CENTER
AND
CONSOLE

ROOM 3619
CHIEF ICC OFFICE
(10 X 12)

FILE
CABINET
(GFE)

12" RAISED FLOOR
(2' X 2' FLOOR TILES)

ICC ROOM (15' X 15')

ROOM 3620

APPROXIMATE AREA
FOR CONSOLE

APPROX
AREA
FOR
MONITORING
DISPLAYS

CORRIDOR

FACING CONSOLE

GLASS WINDOW

NARROW
BAND
FAX
(GFE)

DELTA
DATA
TERMINAL
(GFE)

ATEX
TERMINAL
(GFE)

BUILDING
COLUMN

PRINTER
(CONTRACTOR)

RAMP AREA

CORRIDOR

3.1.1   Signal Routing Functional Description

The INTERNET Control Center System shall provide for the routing of video and audio signals from the INTERNET Control Center (Room 3620) to the TV Center (Room 2715) and to the INTERNET System. The ICC System shall also provide for the routing of audio signals between the ICC and the computer room (Room 3802).

3.1.1.1   Video

The INTERNET Control Center System shall provide for selectively routing video signals from and to the TV Center where they interface with the INTERNET System for distribution.

3.1.1.2   Audio

The INTERNET Control Center System shall provide for selectively routing audio signals from and to the TV Center where they interface with the INTERNET System and from and to the computer room (Room 3802).

3.1.2   Monitoring Functional Description

The INTERNET Control Center System shall provide for displaying the status of the INTERNET System as well as monitoring signals passing through the console.

3.1.2.1   Signal Routing

The INTERNET Control Center System shall provide for displaying the routing configuration of audio and video signal paths controlled by the console.

3.1.2.2   System Link Status

The INTERNET Control Center System shall provide for displaying the link status of the INTERNET System for audio, video, and wideband facsimile.

3.1.2.3   Video

The INTERNET Control Center System shall provide video monitors for monitoring the incoming and outgoing video signals being controlled by the INTERNET Control Officer.

3.1.2.4   Audio

The INTERNET Control Center System shall provide for monitoring the incoming and outgoing audio signals being controlled by the INTERNET Control Officer.

3.1.3   **Time Functional Description**

The INTERNET Control Center System shall provide for the displaying of time references used by the INTERNET Control Officer.

3.1.3.1   **Local Time**

The INTERNET Control Center System shall provide for displaying worldwide time zones.

3.1.3.2   **Elapsed Time**

The INTERNET Control Center System shall provide for displaying elapsed time of link activity for TV, wideband facsimile, and each of the audio channels.

3.1.4   Orderwire Functional Description

The INTERNET Control Center System shall provide for 2 orderwires to be used by the INTERNET Control Officer in coordinating INTERNET activities.

3.1.4.1   Technical Orderwire

The INTERNET Control Center System shall provide space in the console for GFE orderwire equipment for communications between the ICO and all of the ground stations of INTERNET. This orderwire shall be a dial-up service connecting any two or multiple combination of stations with each other.

3.1.4.2   Common Talk Orderwire

The INTERNET Control Center System shall provide an orderwire connecting the ICO with all designated stations on the INTERNET System. This orderwire shall provide open speaker communications to all stations at the same time and to the Independent Hill Ground Station at Independent Hill, Virginia.

3.1.5   Telephone and Intercom Functional Description

3.1.5.1   Intercom

The INTERNET Console shall provide an intercom system linking the console with the TV Center located in Room 2715 and the Wire Service Officers desk located in the adjacent room (Room 3617).

3.1.5.2   Telephone

The INTERNET Console shall provide space for GFE telephone equipment.

3.2   **INTERNET Control Center System Functional and Performance Specifications**

3.2.1   **Signal Routing Functions**

3.2.1.1   **Video**

The INTERNET Control Center System shall provide for the capability to route any of seven input video signals to any of ten output ports. Figure 3.2.1.1-1 depicts the flow of the video routing. The capability shall exist to expand the routing to at least eight more inputs and five more outputs.

3.2.1.2   Audio

The INTERNET Control Center System shall provide the capability to route any of the 16 audio inputs (as seen from the audio router) to any of the 18 designated audio outputs (also with reference to the audio router). Figures 3.2.1.2-1 and 3.2.1.2-2 depict the incoming and outgoing audio channels with the possible destinations. The capability shall exist to expand the routing to at least six more incoming and outgoing channels.

3.2.2   Monitoring Functions

Figure 3.2.2-1 depicts the status monitoring functions associated with the INTERNET Control Center System.

3.2.2.1   Signal Routing

The INTERNET Control Center System shall provide the capability to display the status of the video and audio routing functions. This display shall show the configuration of the routing and what paths are available. This display shall be automatically updated when changes are made to the routing of any audio or video path.

3.2.2.2   System Link Status

The INTERNET Control Center System shall provide the capability to display the status (which link is in use and direction of traffic) of the INTERNET links (TV, wideband facsimile, and audio). This display shall show a world map with the INTERNET ground stations identified. Different colors shall be used to distinguish between each of the three types of signals (TV, wideband facsimile, and audio) being transmitted over the INTERNET System. Updates to this display shall be made automatically from information received from the Control and Status Computer. The display shall be easily visible from anywhere in the ICC.

INTERNET CONTROL CENTER/CONSOLE

VIDEO MONITORING DISPLAY FUNCTION
(CAPABLE OF SIMULTANEOUSLY DISPLAYING ANY FOUR INPUTS AT A TIME)

| MULTI STD MONITOR | NTSC | NTSC | NTSC |

VIDEO TEST & MONITORING EQUIPMENT

WAVEFORM MONITOR
VECTORSCOPE
COLOR BAR GENERATOR

HIGH RESOLUTION LARGE SCREEN MONITOR

(CAPABLE OF DISPLAYING ANY OF THE AVAILABLE NTSC VIDEO SIGNALS)

VIDEO ROUTER

TV GRID RECEIVER

(NTSC)

INTERNET (OUTGOING)

PLAYBACK-1   TV-2A

INTERNET   INTERNET   TVRO-1   TVRO-2   PLAYBACK-2   TV-2B

| TV CENTER | CONVERSION TO NTSC | TVRO-1 | TVRO-2 | PLAYBACK | TV GRID |

WIDEBAND FACSIMILE
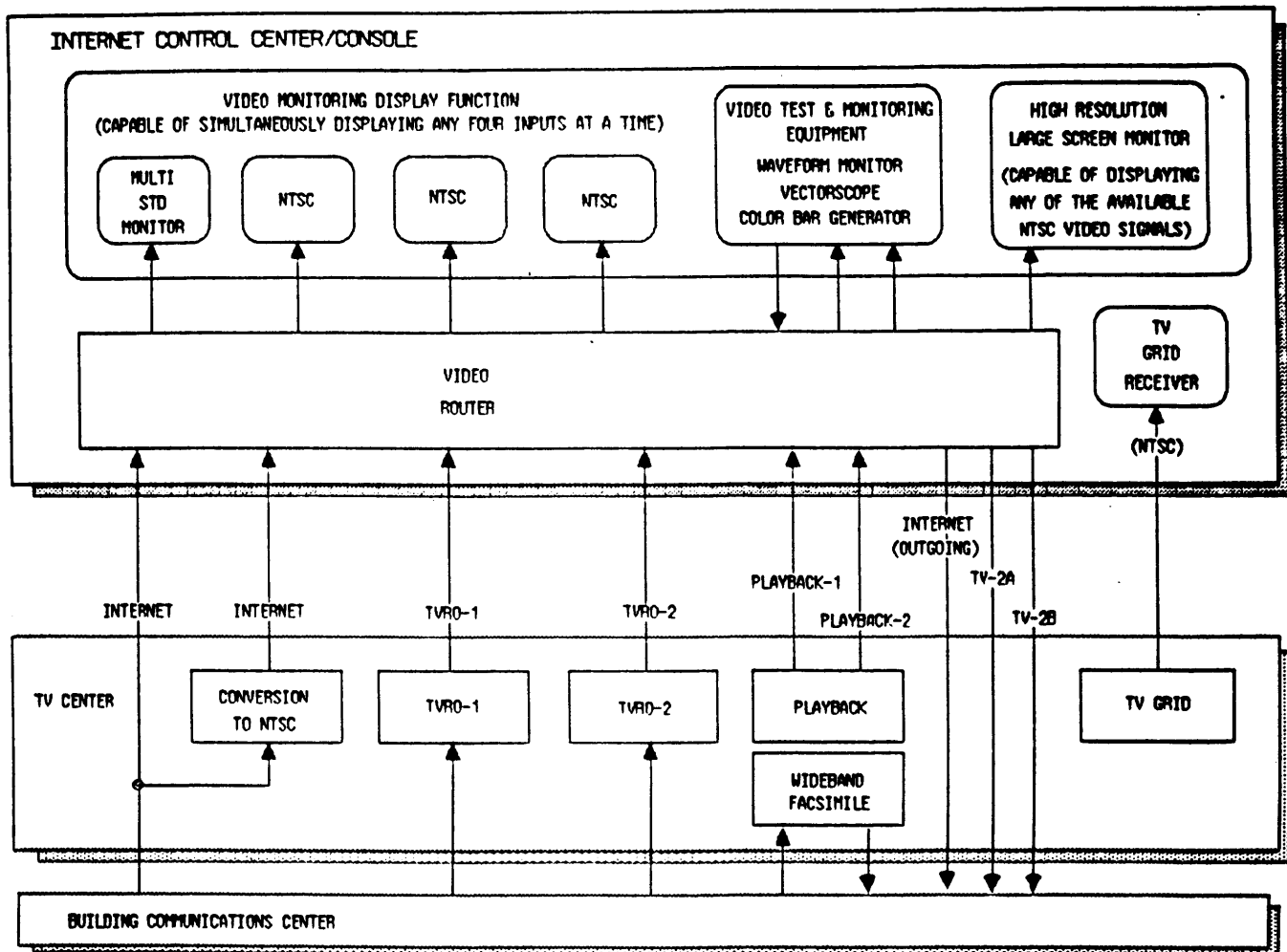
BUILDING COMMUNICATIONS CENTER

FIGURE 3.2.1.1—1

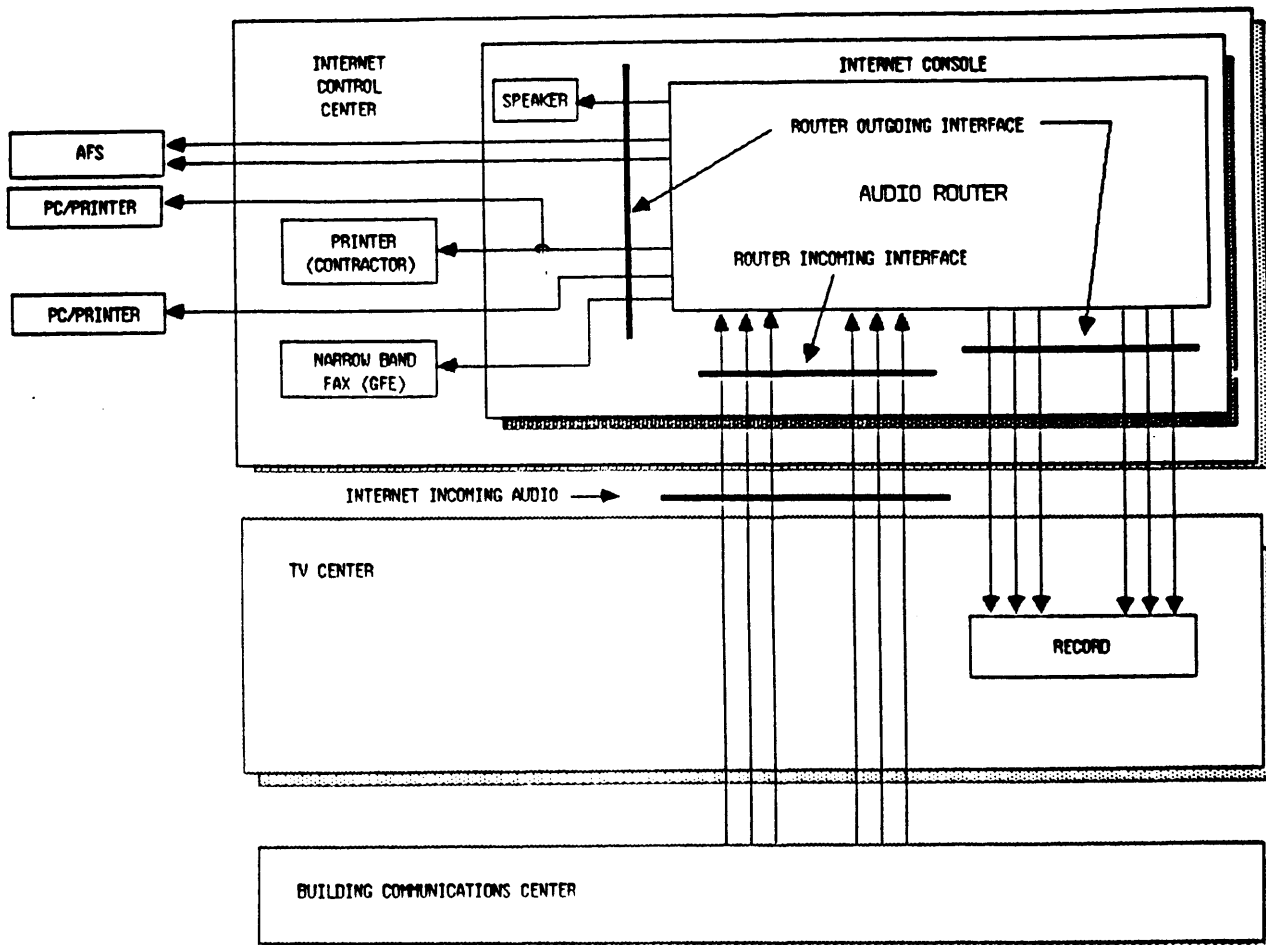INTERNET VIDEO ROUTING & DISPLAY

FIGURE 3.2.1.2—1

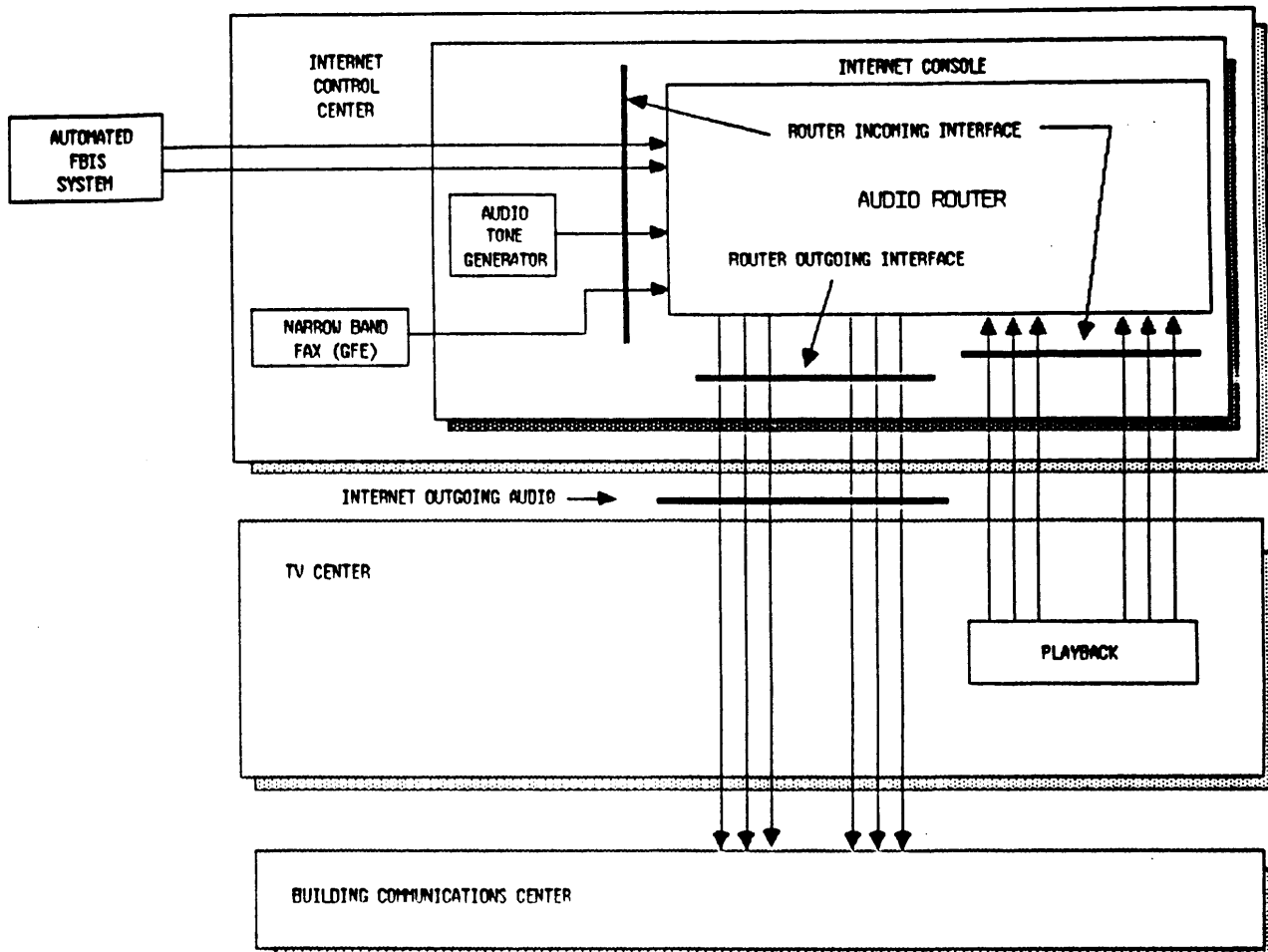INTERNET AUDIO ROUTING (INCOMING)

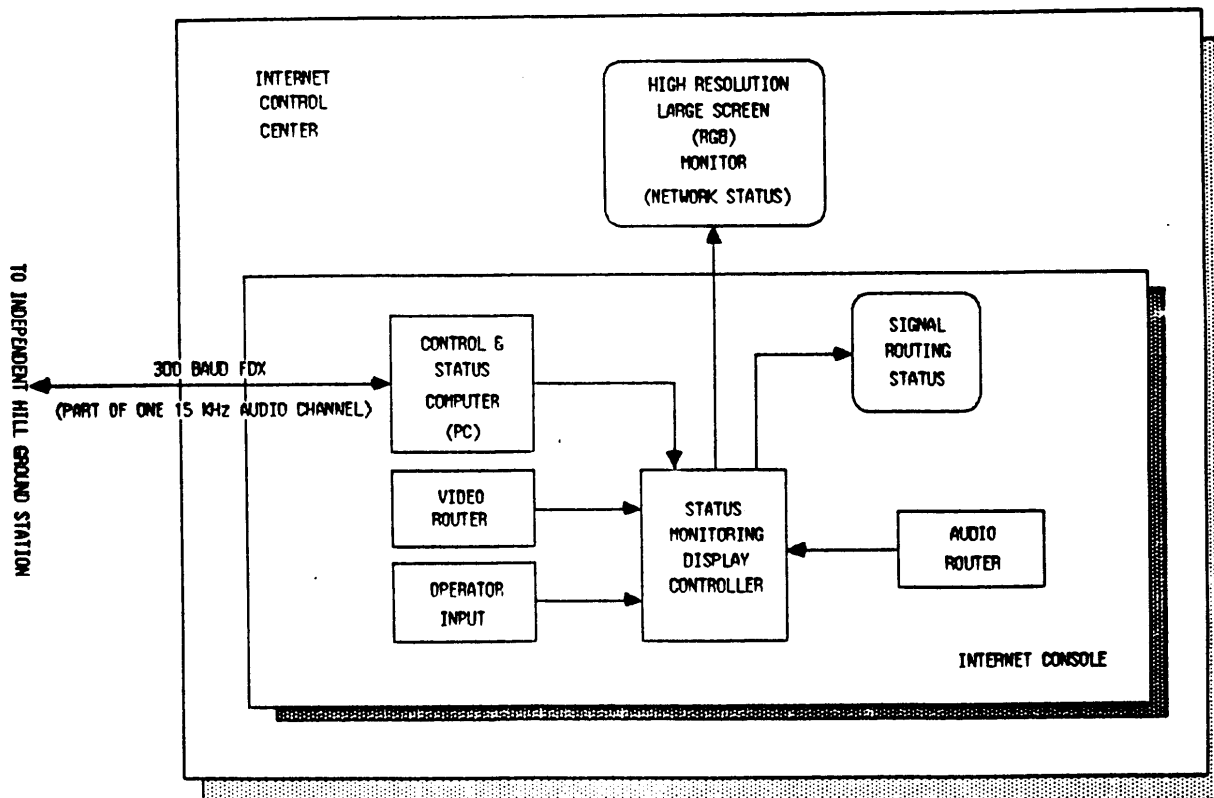FIGURE 3.2.1.2—2

INTERNET AUDIO ROUTING (OUTGOING)

FIGURE 3.2.2—1

INTERNET STATUS MONITORING FUNCTION

3.2.2.2   System Link Status (cont'd)

The PC based Control and Status Computer shall allow for automatic time tagged commands to be sent to the ground stations to control INTERNET link activity. The ICO shall have the capability to override the programmed commands at any time to reconfigure the INTERNET System as needed. Status from the INTERNET System shall be fed back to the PC. Control and status information shall be transferred to the Status Monitoring Display Controller for displaying the INTERNET System configuration.

3.2.2.3   Video Signals Monitoring

The INTERNET Control Center System shall provide the capability to monitor the video signals passing through the console. This shall include the use of video test equipment, i.e. waveform monitor, vectorscope, and color bar pattern generator for testing signal quality and sending test patterns. Figure 3.2.1.1-1 illustrates the video signals to be displayed. Four color monitors shall be mounted so as to be easily visible to the ICO while a large screen color monitor shall be mounted so as to be easily visible from anywhere in the ICC. The four smaller monitors shall each be capable of displaying any one of the available video signals. One of these monitors shall be capable of displaying multi-standard video signals. The large monitor shall be capable of displaying any of the NTSC video signals. The Contractor shall incorporate the required technology to provide the highest video resolution attainable.

A television receiver shall be mounted where it is easily visible to the ICO and shall be capable of displaying television signals from the TV Grid (cable to be supplied as well as signals fed from the TV Center). The TV receiver shall have remote control capability so that the ICO can easily change channels and adjust volume.

3.2.2.4   Audio Signals Monitoring

The INTERNET Control Center System shall provide the capability to monitor any audio channel or associated audio from TV transmission. A speaker with volume control shall be located in the console and easily accessible by the ICO. VU meters shall be provided for measuring signal levels. A tone generator shall be provided for sending test tones over the audio channels.

3.2.3   Time Functions

Figure 3.2.3-1 depicts the time functions to be displayed.

INTERNET
CONTROL
CENTER

TIME DISPLAY

LOCAL TIME

| WASHINGTON |
| STATION A |
| STATION B |
| GMT |

EXPANDABLE
TO
20

ACTIVE LINK
ELAPSED TIME DISPLAY

| TV |
| WIDEBAND FAX |
| AUDIO CH 1-6 |

EXPANDABLE
TO
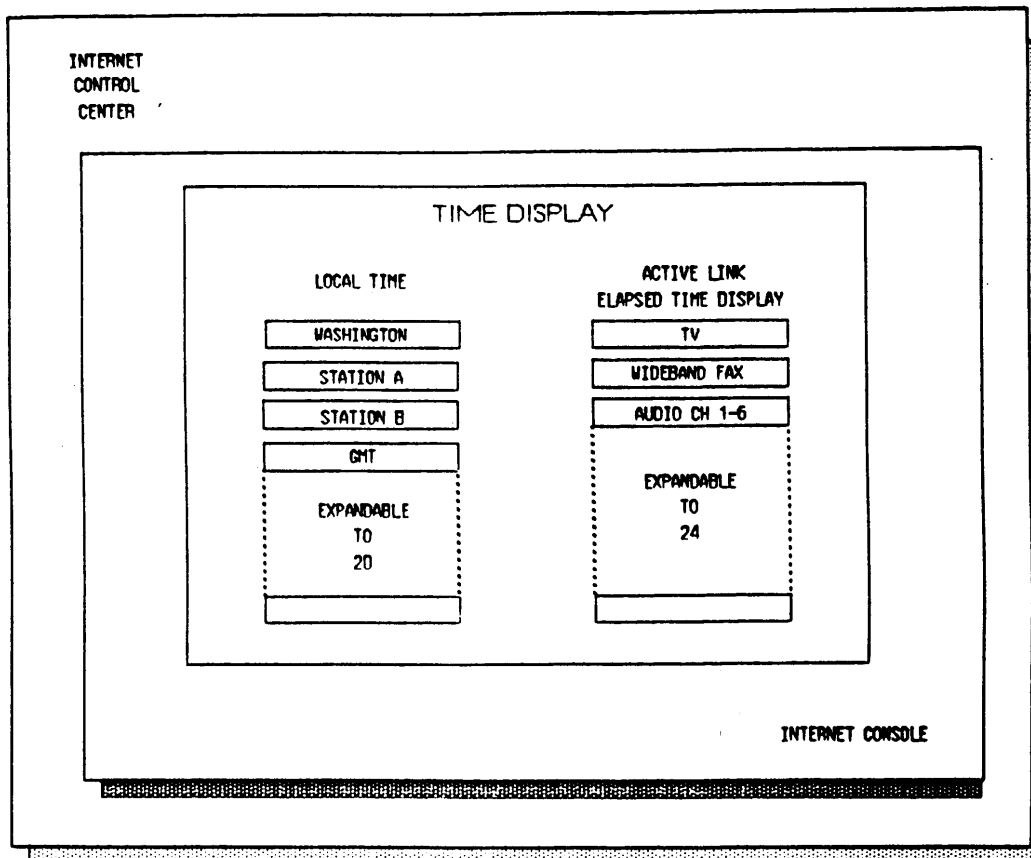24

INTERNET CONSOLE

FIGURE 3.2.3—1

INTERNET TIME DISPLAY FUNCTION

3.2.3.1   **Local Time Display**

The INTERNET Control Center System shall provide for displaying
local time for each of the worldwide INTERNET System nodes as
well as time references selected by the ICO. The number of
different times to be displayed shall be four with the capability
for modular expansion up to twenty. The number to be displayed
shall be at the discretion of the ICO.

3.2.3.2   **Elapsed Time Display**

The INTERNET Control Center System shall provide for displaying
elapsed time for each of the active links on INTERNET (TV,
wideband facsimile, and each audio channel). The elapsed time
clock shall be automatically activated (with manual override) for
each appropriate link based on input from orderwire
communications. The Elapsed Time Display shall be capable of
easily expanding the number of time displays to twenty-four.

3.2.4   Orderwire Functions

Figure 3.2.4-1 depicts the orderwire communications in the
INTERNET Console.

3.2.4.1   Technical Orderwire

The INTERNET Console shall provide space for orderwire
communications equipment. This equipment shall be GFE and be
used by the ICO for communications with any of the other INTERNET
stations. The other stations shall be defined as Stations A
through D and Independent Hill Ground Station. This orderwire
shall be a dial-up service using the 8 KHz half duplex (HDX)
orderwire channel and connect the ICO to any station or
combination of stations. The Technical Orderwire shall provide
hardcopy printout to document commands given.

The Contractor shall design suitable mounting for and install the
following GFE equipment (specific details on this equipment will
be provided later):

      (1)   Zenith computer with two disk drives
      (1)   Monitor
      (1)   Printer
      (1)   Telephone handset with dial
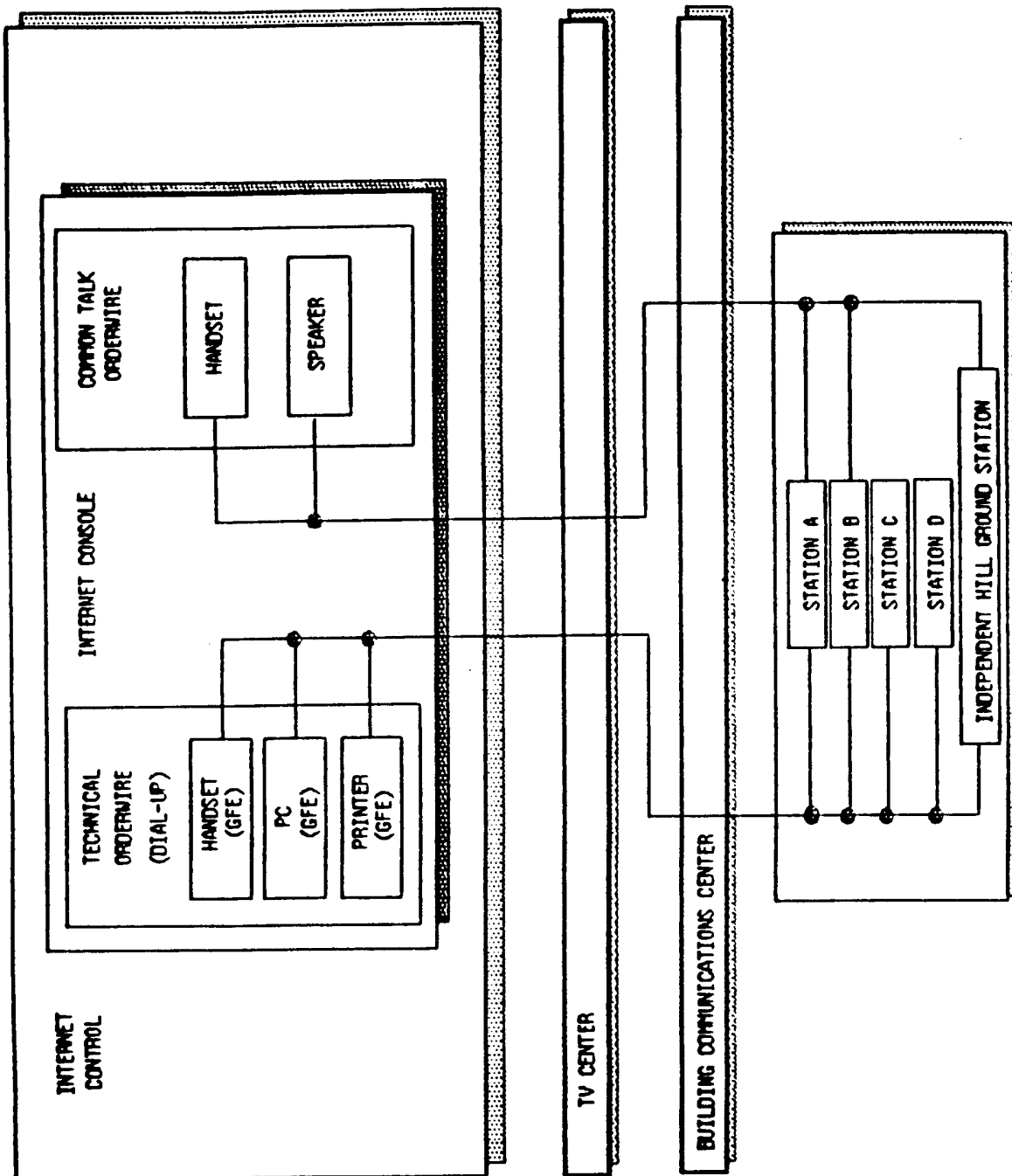   (1)   Dantel circuit equipment (approximately
            1-1/4 x 1-1/2 feet)

FIGURE 3.2.4-1
INTERNET ORDERWIRE ROUTING

3.2.4.2   Common Talk Ordervire

The INTERNET Console shall provide the capability for ordervire communications over a common talk circuit. The ICO shall have the capability to talk to one or more stations ([   ]   STAT [   ], and Independent Hill Ground Station) by picking up a   STAT handset and talking. This is a telephone handset which deactivates the speaker when picked up and has a fixed transmit level from the handset. Any station originating a conversation vill be heard over a speaker at the other stations. Volume control shall be provided for the speaker.

This ordervire shall use a portion of one of the six, 15 KHz, FDX audio channels by using a multiplexing technique. The audio channel goes to the Independent Hill Ground Station for transmission to Stations A and B.

Equipment for this ordervire shall be provided by the Contractor and installed by the Contractor in the INTERNET Console. The Government shall provide installation at the other locations.

3.2.5   Telephone and Intercom Functions

Figure 3.2.5-1 depicts the telephone and intercom service for the INTERNET Console.

3.2.5.1   Intercom

The INTERNET Console shall provide for an intercom system connecting the console with three stations located in the TV Center and one station in the Wire Service Room. The ICO, by selectively pushing the intercom station buttons can establish a voice link between the console and any or all of the stations. This equipment shall be off-the-shelf. The Contractor shall provide all instruments for the intercom system. Lines connecting the console with the TV Center and Wire Service station shall be GFE.

3.2.5.2   Telephone

The INTERNET Control Center System shall provide space for GFE telephone equipment consisting of one Integrated Telephone Equipment (ITE) phone (one instrument with two line capability) to be physically integrated into the console and easily accessible by the ICO.

3.2.6   Ergonomics

The INTERNET Control Center System design shall be compatible with human performance factors. Installation, equipment placement, and all controls shall be in a manner which does not induce stress or fatigue.
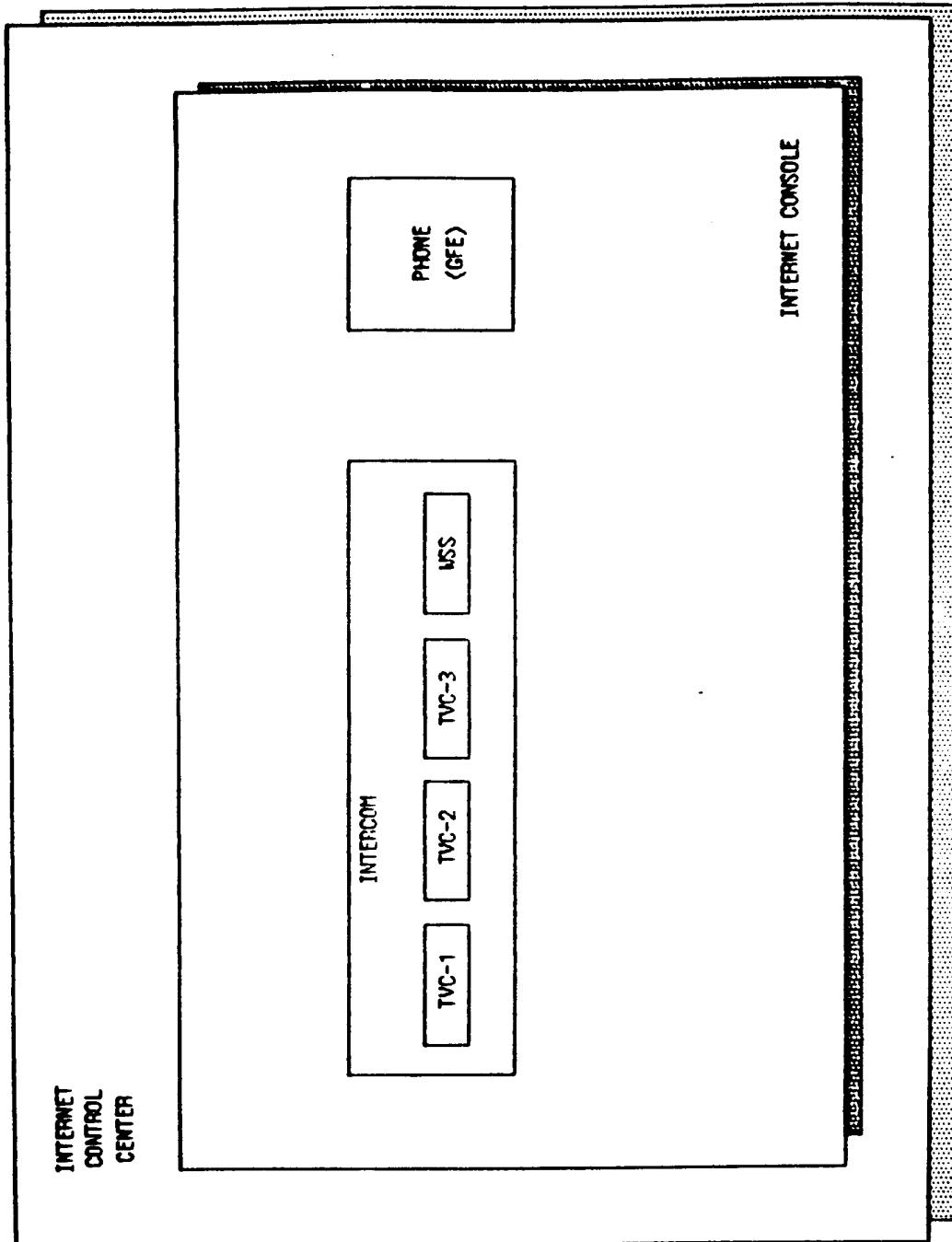
FIGURE 32.5—1

INTERNET CONSOLE TELEPHONE AND INTERCOM

3.3 Control Center System Interface Definition

The following interfaces shall be supported by the INTERNET Control Center System.

3.3.1 INTERNET

This interface shall be as specified in the INTERNET Interface Control Document, MPD-910-200.

3.3.2 Physical Plant

All physical communications and electrical requirements shall conform to the Reston Center Architectural Drawings (drawings to be made available to the successful bidder).

3.4 System Availability/Reliability

3.4.1 Allocation

The INTERNET Control Center System shall have a steady-state availability of at least 0.985 for switching, monitoring, control and timing functions. The INTERNET Control Center System steady-state availability shall be statistically derived from operational on-line data.

3.4.2 Lifetime Requirements

The INTERNET Control Center System design, implementation, and installation shall provide an expected useful life of at least 10 years.

3.4.3 Single Point Failure

No single point failure in the system shall cause termination of the capability to operate for a period greater than the MTTR specified in paragraph 3.4.4. A single point failure shall be defined as any single malfunction in equipment, an operational error, or an inadvertent command that would preclude the capability of the system to meet these requirements. Those non-redundant equipment items whose failure could cause loss of function for greater than the MTTR specified in paragraph 3.4.4 shall be identified as candidates for sparing.

3.4.4 Mean-Time-To-Restore (MTTR)

The INTERNET Control Center System shall have a Mean-Time-To-Restore of not more than:

a) 5 minutes following any single failure in equipment not requiring removal and replacement,

b) 30 minutes following failure of equipment requiring removal and replacement, and for which spares exist.

3.5   **System Maintainability**

The requirements in this section apply to newly designed hardware and software. These requirements shall be used as a guide in the procurement of off-the-shelf hardware and software.

3.5.1   **Fault Isolation**

The INTERNET Control Center System design shall provide the capability to verify operational paths and to indicate and isolate failures down to the Lowest Replaceable Unit (LRU). Software and hardware provisions of existing off-the-shelf equipment shall be employed to the maximum extent possible. Critical circuits shall provide visual indications of signal presence and appropriate pick-off points (signal break-outs) to support fault isolation.

3.5.2   **Ergonomics**

The INTERNET Control Center System design and maintenance procedures shall be compatible with human performance factors so that maintenance functions can be accomplished safely and without introduction of human-induced defects.

3.5.3   **Maintenance**

Necessary equipment shall be supplied to support maintenance, inspection and verification of hardware status. Software and hardware provisions of existing off-the-shelf equipment shall be employed to the maximum extent possible.

3.5.4   **Equipment Packaging**

Equipment packaging and installation shall facilitate access for replacement of modules of new designs or off-the-shelf equipment requiring corrective maintenance.

3.5.5   **Equipment Checkout**

Checkout features shall permit validation of the system, segment and equipment including all subassembly redundancies. Checkout time requirements shall not interfere with attainment of primary mission objectives.

3.5.6   **Non-Interruptive Maintenance**

Equipment shall be configured such that corrective and preventive maintenance can be performed on redundant equipment while the remainder of the equipment is actively supporting operations.

3.5.7   Marking and Interchangeability

All modules and equipment shall be marked with a manufacturer's part number and serial number or by other coded schemes employed by commercial vendors. Equipment with identical part numbers shall be functionally and physically interchangeable.

3.5.8   Accessibility

The INTERNET Control Center System shall be designed and constructed such that adjustment, testing, repair or replacement of any component can be effected without extensive mechanical disassembly or electrical disconnection, nor shall these operations result in damage to any part of the system equipment. Manufacturer's procedures and guidance shall be employed for all off-the-shelf equipment.

Space shall be provided around equipment such that all normal operations can be performed without requiring the operator to assume unstable positions and/or to move equipment in order to operate other equipment.

3.5.9   Fault Detection and Correction

The INTERNET Control Center System shall incorporate provisions to test each subsystem and equipment for proper operation and to diagnose and isolate failures within any equipment to the lowest field replaceable unit. The design shall permit the accomplishment of maintenance functions with a minimum of specialized requirements for personnel, equipment, or spares support.

3.5.10   Environmental Conditions

The INTERNET Control Center System shall be capable of operating at the standard (office) environmental conditions for FBIS Headquarters. For purposes of design modeling, these conditions are 17°C $\pm$ 10°C and 50% $\pm$ 30% relative humidity, non-condensing.

3.5.11   Transportability and Handling

Equipment design and fabrication shall be such that operational performance will not be degraded and mechanical damage will not be incurred as a result of transportation and handling required to achieve equipment installation in its operational location. Transportation and handling includes lift-truck operations, air or truck shipment, and movement at it destined locations.

3.5.12   **Security**

The design of the INTERNET Control Center System shall conform to the following as applicable:

a) Permit data access only to properly authorized personnel or interfacing systems, and/or

b) Provide an audit trail of computer transactions where applicable.

3.5.13   Safety

Safety analyses shall indicate design compliance with the facility or process safety criteria specified by NAB Standards. Manufacturer's equipment shall provide safe physical operation with attention to marking and warning labels. Catastrophic hazards shall be eliminated. Critical facility or process hazards shall be minimized and controlled through appropriate safety devices, warning devices and/or special procedures.

The operator shall be provided an acoustical environment that shall not cause injury or fatigue, interfere with direct person to person voice communications or telephone communications, or in any other way degrade overall system effectiveness.

3.5.14   Operability

3.5.14.1   Degree of Automation

The INTERNET Control Center System shall be designed such that operational functions and the routine support functions require minimal action by operations personnel.

3.5.14.2   Use of Redundancy Features

The INTERNET Control Center System and its components shall be designed such that redundant capabilities where provided to meet availability requirements shall be usable for verification, training, development or operations.

3.5.15   Design and Construction Practices

3.5.15.1   General

The INTERNET Control Center System and its components shall provide interchangeability of mechanical and electrical components or subassemblies, without changing wiring, cabling or mounting. All components, subassemblies and wiring, shall be easily accessible to the technician when replacement is required.

3.5.15.2   Cabling

Cables, regardless of length, shall be marked with wrap-around numbers or letter cable markers at both ends. Marking codes used on cables shall correspond to codes shown on drawings and/or run sheets.

Inter-rack cabling shall be neatly strapped, dressed, and adequately supported.

Terminal blocks, boards, strips, or connectors shall be furnished for all cables which interface with racks, cabinets, consoles, or equipment modules.

No audio cables shall run directly to the audio patch panel jacks. Each audio patch panel shall be furnished with an audio terminal block, and all audio cables to and from the audio patch panel shall terminate on this block.

Cable shall be grouped according to signals being carried. In order to reduce signal contamination, separate groups shall be formed as follows:

a)   Power cables,

b)   Control cables,

c)   Video cables, and

d)   Audio cables.

3.5.15.3   Controls

Controls used frequently in the operation of system equipment shall be located on control panels and have ready accessibility.

3.5.15.4   Control Panel Identification

Panel marking for identification of controls and indicators shall be legible and permanent. Color of the marking shall be of a contrasting color to that of the panel.

3.5.15.5   Metal Parts

All metal parts, where practical, shall be treated or coated to prevent corrosion. When dissimilar metal parts are used together they shall be suitably protected to prevent electrolytic corrosion.

3.5.15.6   Workmanship

All equipments and assemblies shall be constructed in keeping with recognized good manufacturing and electrical assembly practices.

3.5.15.7   Reliability

The INTERNET Control Center System and the design of its segments shall emphasize high reliability from initial concept throughout the design and fabrication cycle. Reliability efforts during design shall have the following objectives:

a)   Simplicity of design and construction,

b)   Incorporation of redundancy to provide adequate backup equipments to compensate for failures,

c)   Provision for failure detection and rapid failure correction,

d)   Hardware failures shall not precipitate failures in interfacing equipment nor disable other system equipment.

3.6   System Expansion/Upgrade

The INTERNET Control Center System design shall not preclude future expansion/upgrade to support potential increases in signal input or output routing or display.

3.6.1   Hardware

Commercial hardware upgrades shall not require changes to applications software or user procedures.

3.6.2   Software

Applications software shall not require modification to support increased processing capability or number of users and devices or installation of upgrades to commercial software (e.g., updating systems release).

3.6.3   Firmware

Firmware changes shall not require changes to applications software.

3.7   Transition

Each new INTERNET Control Center System capability or modification to an existing capability shall be designed and implemented in a manner which shall allow the new and/or modified capability to be developed, installed, checked-out, tested and transitioned to operational status (including required training) without adversely affecting on-going operations.

4.0   **VERIFICATION**

4.1   **Description**

All requirements defined in Section 3.2 shall be verified.
Verification shall be accomplished by either Inspection,
Analysis, Test, or Demonstration as defined in 4.2.1 through
4.2.4 below and in accordance with NAB standards where
applicable. Regardless of which category of verification is
exercised, appropriate documentation shall be generated to record
the process or event and any conclusive results.

4.2   Verification Categories

4.2.1   Inspection (I)

Verification of a requirement through inspection shall be
accomplished by examination of a configuration or a functional
result, i.e., a physical or visual review.

4.2.2   Analysis (A)

Verification of a requirement by analysis shall be accomplished
by:

a)   conducting comparative evaluations, and/or

b)   Executing numerical or statistical algorithmic calculations.

Resultant data must be received which meets or exceeds a
pre-determined expectation in order to certify the process as
successful.

4.2.3   Test (T)

Verification of a requirement through testing shall be
accomplished by performing procedures at either the component
level or the functional level and achieving results which meet or
exceed the specification in question. For the purpose of
testing, a functional level test shall be a sequential or
parallel test of more than one component when needed to achieve
specified results. Results, from tests conducted on specific
segments of the design below the "system" level, shall be
assessed against values derived from the system specifications or
ICDs. Simulation software or special hardware may be required to
emulate/simulate external interfaces or data from an internal
function. Analysis of test results where necessary to verify
compliance is implied.

4.2.4   Demonstration (D)

Verification of requirements by demonstration shall be accomplished through the execution of formally documented test procedures which exercise all or part of the system including operational external interfaces. The verification shall be deemed satisfactory when the results meet or exceed the specifications documented (as pass/fail indicators) in the test procedures.

5.0   FACILITIES

5.1   Headquarters

The INTERNET Control Center System designs and implementations shall adhere to State and County fire and safety regulations.

(

6.0   NOTATIONS AND DEFINITIONS

6.1   System Availability Definition

System Operational availability shall be calculated as follows:

$$AO = \frac{uptime}{uptime + downtime}$$

where:
  AO = Operational availability
  uptime = Schedule operating time
  downtime = Time schedule but not operational
                (spares are not scheduled)

6.2   Reliability Definitions

6.2.1   Mean-Time-To-Repair (MTTR)

MTTR is defined as the total corrective maintenance time divided by the total number of corrective maintenance actions during a given time period. The total corrective maintenance time is taken to be that time associated with the repair of the unit and shall include that time normally associated with maintenance logistics or administration.

6.2.2   Availability

Availability is defined as the probability that a system, segment, subsystem, piece of equipment, or component is in operating condition or is operable at any random instant of time. The availability assessments of the INTERNET Control Center System shall include the effects of reliability, maintainability, replacement times, planned production procurement cycles, and logistics (personnel and material) factors as appropriate.

6.2.3   Mean-Time-To-Restore

Mean time to restore is defined as the interval of time required to restore a given function after a malfunction exists and ending at such time as the affected function is restored and operating within specification limits.

6.2.4   Steady State Availability

Steady State Availability is defined as the probability that those INTERNET Control Center System functions required to support the INTERNET System are in an operating condition.

FBIS

INTERNET - HEADQUARTERS

INTERFACE CONTROL DOCUMENT

MPD-910-200

15 JANUARY 1987

CHANGE LOG

TITLE: INTERNET - HEADQUARTERS INTERFACE CONTROL DOCUMENT MPD-910-200

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LIST OF FIGURES

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1.0 INTRODUCTION

1.1 Purpose

This Interface Control Document (ICD) is concerned with the domestic segment of the INTERNET System. It describes the various electrical and physical interfaces between the INTERNET Control Center (ICC) at Reston and the following elements:

a) Television Center (TVC)

The area designated for converting, recording and storing signals (TV and audio) or printing them (wideband facsimile) as necessary.

b) INTERNET

The satellite based communications network that will link FBIS field assets with FBIS Headquarters in Reston, Virginia.

c) Automated FBIS System (AFS)

The Automated FBIS System supporting collection, publishing, analysis and other FBIS automation functions.

d) Television Receive Only (TVRO)

The existing monitoring resource that will be integrated into the INTERNET System.

e) FBIS Consumers (FC)

The group comprised of internal members of FBIS that require FBIS products.

f) OIR Consumers

The group comprised of offices served by the OIR TV grid.

g) External Consumers (EC)

The group consisting of agencies and organizations that desire to receive FBIS products.

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Page 2

1.2   Overview

In an effort to enhance communications capability, the Foreign Broadcast Information Service (FBIS) will establish, operate, and maintain INTERNET - a new, dedicated, satellite based network. The INTERNET System is comprised of three basic elements: the space segment which includes an Intelsat satellite transponder used for relaying information between FBIS Headquarters and the FBIS field bureaus; the domestic segment which includes Independent Hill Ground Station, the INTERNET Control Center at Reston; and the foreign segment which includes [   ] and their associated ground   STAT stations.

The Reston ICC, depicted in Figure 1.2-1, will be the focal point for all INTERNET related tasking, requests, and queries from FBIS, OIR and external consumers. As shown, it will receive and transmit a variety of audio, video, and facsimile signals to the foreign segment via the Independent Hill Ground Station.
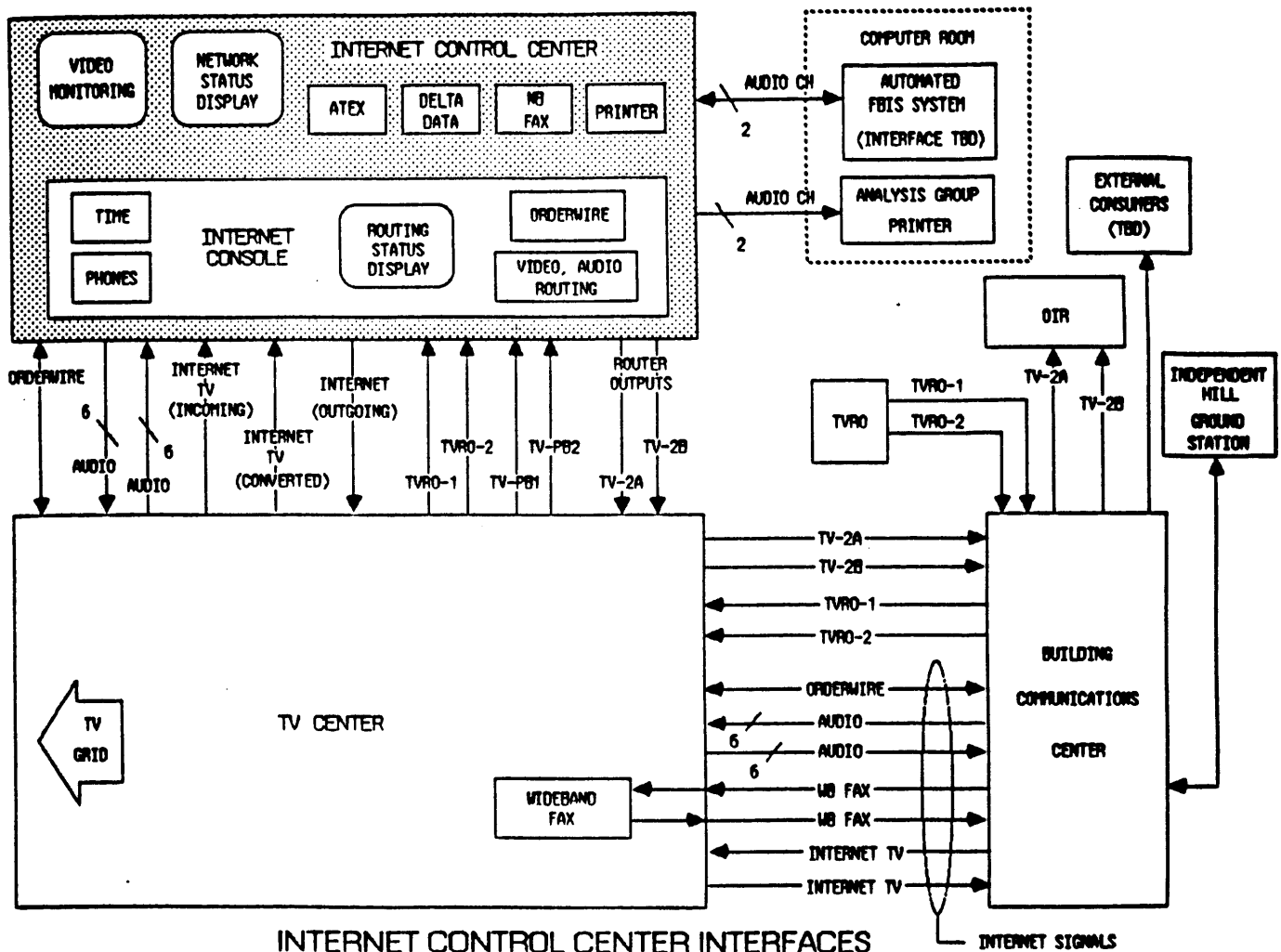
INTERNET CONTROL CENTER INTERFACES

FIGURE 1.2—1

2.0   APPLICABLE DOCUMENTS

INTERNET Operations Concept Paper dated 31 March 1986.

INTERNET Control Center System Specification, MPD-910-001

INTERNET - Bureaus Interface Control Document, MPD-910-201

3.0   INTERFACE REQUIREMENTS - DOMESTIC

3.1   ICC/TVC Interface

The INTERNET Control Center shall interface to the TV Center via several communication links as depicted in Figure 3.1-1. INTERNET signals will come into the Reston Building Communications Center via fiber optic cable. The signals which will cross the ICC/TVC interface are as follows:

a) INTERNET TV (unconverted)

The raw (PAL or SECAM format) television signal received via INTERNET and sent to the ICC for monitoring. This same signal is also made available to the TV Center for conversion.

b) INTERNET TV (converted)

The INTERNET television signal (PAL or SECAM) that is converted to NTSC in the TV Center.

c) TVRO-1

The raw television signal received via the TVRO System and sent to the TVC for conversion and/or recording.

d) TVRO-2

A second television signal identical in form and function to TVRO-1.

e) Playback TV (TV-PB1, TV-PB2)

The two television signals received from the TVC which may be any one of the following:

    a) Converted TVRO television,
    b) Pre-recorded 5-cities programs,
    c) Live television (INTERNET and/or commercial cable), and
    d) Pre-programmed or ad hoc training.

f) INTERNET TV - Outgoing

The television signal routed from the ICC for transmission over the INTERNET System. The selection of material to be sent is determined by the INTERNET Control Officer (ICO).

g) TV-2A

The television signal sent from the ICC to the OIR TV Grid. The selection of which TV signal is to be sent is determined by the ICO.

h) TV-2B

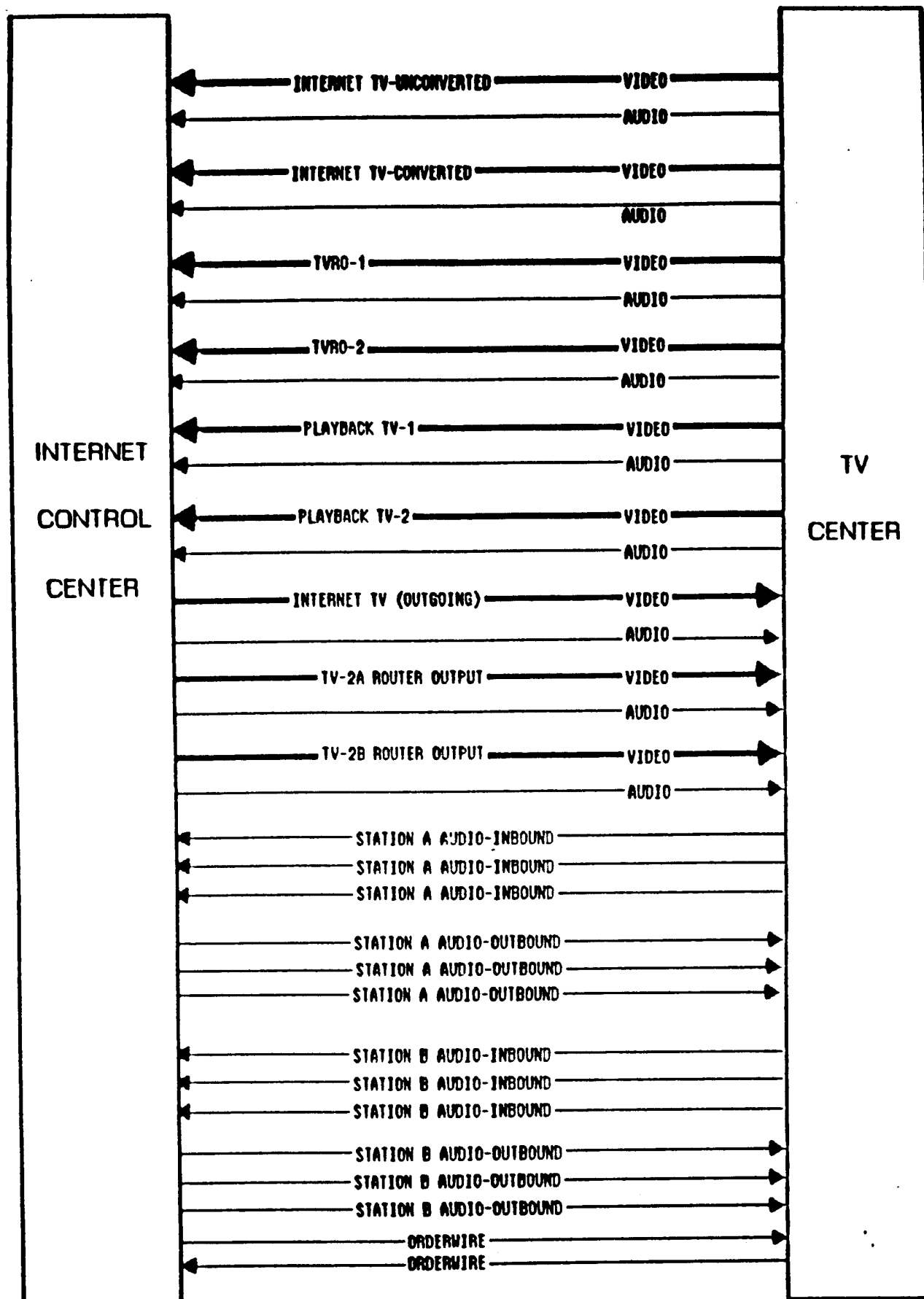A second television signal identical in form and function to TV-2A.

FIGURE 3.1-1
ICC/TVC COMMUNICATIONS INTERFACE

3.1   ICC/TVC Interface (cont'd)

i) [   ] **Audio - Inbound**   STAT

The audio signal from [   ] received via INTERNET and sent to the STAT
TVC for recording. In addition to voice, this signal may carry
radio-teletype or narrowband facsimile information, which will not go
to the TVC.

j) [   ] **Audio - Inbound**   STAT

The audio signal from [   ] received via INTERNET that is   STAT
identical in form and function to the signal above.

k) [   ] **Outbound**   STAT

The audio signal originating in the TVC and sent to the ICC for
routing to [   ] via INTERNET.   STAT

l) [   ] **Audio - Outbound**   STAT

The audio signal originating in the TVC and sent to the ICC for
routing to [   ] via INTERNET   .STAT

m) Ordervire

The control signal used for coordination purposes by the ICO.

The physical location of the ICC/TVC interface shall be in the TV
Center (Room 2715).

3.1.1   INTERNET TV - Unconverted

3.1.1.1   Video

3.1.1.1.1   Circuit Characteristics

The connectivity between the ICC and the TVC for the baseband
video portion of the unconverted INTERNET television signal shall be via a
dedicated 75 ohm unbalanced RG-59 coaxial cable circuit/BNC connection.

3.1.1.1.2   Signal Characteristics

The unconverted INTERNET television signal shall be a baseband
video signal which shall meet the following transmission parameters:

        Level: 1V peak-to-peak
        Return Loss: 24 dB (minimum)
        Bandwidth: 50 Hz - 4.2 MHz (NTSC)
                        50 Hz - 5 MHz (PAL)
                        50 Hz - 6.5 MHz (SECAM)

3.1.1.2   Audio

3.1.1.2.1   Circuit Characteristics

The connectivity between the ICC and the TVC for the baseband audio portion of the unconverted INTERNET television signal shall be via a dedicated 600 ohm balanced circuit/barrier strip connection.

3.1.1.2.2   Signal Characteristics

The baseband audio portion of the unconverted INTERNET television signal shall meet the following transmission parameters:

          Bandwidth: 40 Hz - 15 KHz
          Level: + 10 dBm (maximum)

3.1.2   INTERNET TV - Converted, TVRO-1, TVRO-2, TV-PB1, TV-PB2

3.1.2.1   Video

3.1.2.1.1   Circuit Characteristics

The connectivity between the ICC and the TVC for the baseband video portion of the converted INTERNET and TVRO television signals as well as playback TV signals shall be via a dedicated 75 ohm unbalanced RG-59 coaxial cable circuit/BNC connection.

3.1.2.1.2   Signal Characteristics

The converted television signals and playback signals shall be a baseband video signal which shall meet the following transmission parameters:

          Level: 1V peak-to-peak
          Return Loss: 24 dB (minimum)
          Bandwidth: 50 Hz - 4.2 MHz (NTSC)

3.1.2.2   Audio

3.1.2.2.1   Circuit Characteristics

The connectivity between the ICC and the TVC for the baseband audio portion of the converted television signals and playback TV signals shall be via a dedicated 600 ohm balanced circuit/barrier strip connection.

3.1.2.2.2   Signal Characteristics

The baseband audio portion of the converted television signals and playback TV signals shall meet the following transmission parameters:

          Bandwidth: 40 Hz - 15 KHz
          Level: + 10 dBm (maximum)

3.1.3   INTERNET TV (Outgoing)

3.1.3.1   Video

3.1.3.1.1   Circuit Characteristics

The connectivity between the ICC and the TVC for the baseband video portion of the outgoing INTERNET television signal shall be via a dedicated 75 ohm unbalanced RG-59 coaxial cable circuit/BNC connection.

3.1.3.1.2   Signal Characteristics

The outgoing INTERNET television signal shall be a baseband video signal which shall meet the following transmission parameters:

Level:	1V peak-to-peak
Return Loss:	24 dB (minimum)
Bandwidth:	50 Hz - 4.2 MHz (NTSC)
	50 Hz - 5 MHz (PAL)
	50 Hz - 6.5 MHz (SECAM)

3.1.3.2   Audio

3.1.3.2.1   Circuit Characteristics

The connectivity between the ICC and the TVC for the baseband audio portion of the outgoing INTERNET television signal shall be via a dedicated 600 ohm balanced circuit/barrier strip connection.

3.1.3.2.2   Signal Characteristics

The baseband audio portion of the outgoing INTERNET television signal shall meet the following transmission parameters:

Bandwidth:	40Hz - 15 KHz
Level:	+ 10 dBm (maximum)

3.1.4   TV-2A, TV-2B

3.1.4.1   Video

3.1.4.1.1   Circuit Characteristics

The connectivity between the ICC and the TVC for the baseband video portion of the TV-2A and TV-2B television signals shall be via a dedicated 75 ohm unbalanced RG-59 coaxial cable circuit/BNC connection.

3.1.4.1.2   Signal Characteristics

The TV-2A and TV-2B television signals shall be a baseband video signal which shall meet the following transmission parameters:

Level: 1V peak-to-peak
Return Loss: 24 dB (minimum)
Bandwidth: 50 Hz - 4.2 MHz (NTSC)
                50 Hz - 5 MHz (PAL)
                50 Hz - 6.5 MHz (SECAM)

3.1.4.2   Audio

3.1.4.2.1   Circuit Characteristics

The connectivity between the ICC and the TVC for the baseband audio portion of the TV-2A and TV-2B television signals shall be via a dedicated 600 ohm balanced circuit/barrier strip connection.

3.1.4.2.2   Signal Characteristics

The baseband audio portion of the TV-2A and TV-2B television signals shall meet the following transmission parameters:

Bandwidth: 40 Hz - 15 KHz
Level: + 10 dBm (maximum)

3.1.5   INTERNET Audio (Includes ⬚ **Inbound and   STAT
Outbound)**

3.1.5.1   Circuit Characteristics

The connectivity between the ICC and the TVC for the audio signals shall be via a dedicated 600 ohm balanced circuit/barrier strip connection.

3.1.5.2   Signal Characteristics

The audio signals shall meet the following transmission parameters:

Bandwidth: 40 Hz - 15 KHz
Level: + 10 dBm (maximum)

3.1.6 INTERNET Ordervire

3.1.6.1 Circuit Characteristics

The connectivity between the ICC and the TVC for transmitting/receiving the INTERNET ordervire signal shall be via a dedicated 600 ohm balanced circuit/barrier strip connection.

3.1.6.2 Signal Characteristics

The INTERNET ordervire signal shall meet the following transmission parameters:

Bandwidth: 40 Hz-4 KHz
Level: + 10 dBm (maximum)

4.0 INTERFACE VERIFICATION REQUIREMENTS

4.1 Description

All requirements defined in Section 3.0 shall be verified. Verification shall be accomplished by either Inspection, Analysis, Test, or Demonstration as defined in 4.2.1 through 4.2.4 below. Regardless of which category of verification is exercised, appropriate documentation shall be generated to record the process or event and any conclusive results.

4.2 Verification Categories

4.2.1 Inspection (I)

Verification of requirements through inspection shall be accomplished by examination of a configuration or a functional result, i.e., a physical or visual review.

4.2.2 Analysis (A)

Verification of requirements by analysis shall be accomplished by:

a) conducting comparative evaluations, and/or
b) executing numerical or statistical algorithmic calculations.

4.2.3 Test (T)

Verification of requirements through testing shall be accomplished by performing procedures at the subsystem level achieving results which meet or exceed the specification in question. Tests conducted on specific segments of the design below the "system" level, shall be assessed against values derived from the system specifications or ICDs. Simulation software or special hardware may be required to emulate/simulate external interfaces or data from an internal function. Analysis of test results where necessary to verify compliance is implied.

4.2.4 Demonstration (D)

Verification of requirements by demonstration shall be accomplished through the execution of formally documented test procedures which exercises all or part of the system including external operational interfaces. The verification shall be deemed satisfactory when the resultant data meets or exceeds the specification documented (as pass/fail indicators) in the test procedures.

APPENDIX A   Reston/OIR TV Grid Interface

A.1   Circuit Characteristics

      The connectivity between Reston and Langley for transmitting/receiving television signal shall be via two dedicated full-duplex fiber optic links. Two coaxial cables shall run from the TV Center to a patch panel located in the first floor communications center. The TV signals shall be routed from the communications center over fiber optic cables to Langley.

A.2   Signal Characteristics

      The television signal shall meet the following transmission parameters:

Bandwidth (Baseband)	8 MHz (maximum)
Pre-Emphasis	per CCIR Rec. 405-1

Differential Gain (per EIA RS-250A)

	10% APL	0.5 dB
	50% APL	0.3 dB
	90% APL	0.5 dB

Differential Phase (per EIA RS-250A)

	10% APL	$\pm 1.0°$
	50% APL	$\pm 0.7°$
	90% APL	$\pm 1.0°$

Signal-To-Noise	54-56 dB unweighted, video (per EIA RS-250A)
Square Wave Tilt	$\pm$ 0.5% of the peak-to-peak amplitude (per EIA RS-250A)
Pilot Frequency	8.5 MHz (Refer to CCIR Rec. 401-2)